

# SUPPLEMENT.

## The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1234.—Vol. XXIX.]

LONDON, SATURDAY, APRIL 16, 1859.

[WITH STAMPED.... SIXPENCE.  
JOURNAL] UNSTAMPED, FIVEPENCE.

### THE SOUTH DEVON IRON AND GENERAL MINING COMPANY (LIMITED).

Capital £100,000, in 100,000 shares of £1 each  
(Of which 40,000 have already been subscribed for).

#### DIRECTORS.

WILLIAM SARI, Esq. (firm of Sari and Sons, Cornwall).  
GEORGE ORR, Esq., Brixton Hill, Surrey.  
LYNCH WHITE, Esq., Iron merchant, Upper Ground-street, London; and Clapham.  
WILLIAM SWINFIELD, Esq., Brixton Hill, Surrey.  
RAMUEL BOUSFIELD, Esq., Orington, Sussex; and Streatham Hill, Surrey.  
WILLIAM HUGGINS, Esq., F.R.A.S., Upper Tulse Hill, Surrey.  
(With power to add to their number.)

BANKERS—The City Bank, Threadneedle-street, London; and the Branches of the Devon and Cornwall Bank.

BROKERS—Messrs. Carden and Whitehead, Royal Exchange-buildings, London.

CONSULTING ENGINEER—Joseph Hugo Hitchens, Esq., Devon Great Consols, Tavistock.

SOLICITORS—Messrs. Pritchard and Collette, 57, Lincoln's Inn-fields.

SECRETARY—Mr. George F. Goodman.

OFFICES.—CITY BANK CHAMBERS, THREADNEEDLE ST., E.C., LONDON.

This company has been formed for the purpose of acquiring and working some of the richest and most promising iron and tin mines—the Smallcombe freehold estate, upon which the Atlas tin and iron lodes are now being worked; the Hercules Iron Mine, on the Higher Bowden estate, both in Devon; and the Phoenix Iron Mine, in the parish of St. Issey, Cornwall, as shown in the accompanying plans and reports. The working of these properties alone will constitute this company the greatest vendors of iron ores in the Western Counties.

It is acknowledged that no better opening presents itself for the profitable employment of capital than the mining of iron ore. This ore occurs in greater abundance and regularity than those of other metals, and the demand is constant and increasing, and the sale highly remunerative.

THE ATLAS IRON AND TIN MINES (FREEHOLD).  
This great iron deposit, situated on the Smallcombe estate, lies at the foot of the Dartmoor granite range, and in the same lode as the celebrated old Heytor Iron Mines. Operations were commenced in 1858, and in the course of four months several thousands of tons of rich hematite ore were raised from 15 fathoms of the lode cropping out near the surface, and showing a thickness of ore unequalled for quantity and quality in the West of England.

Besides the iron lode a champion tin lode of great character has been opened on the lode for 50 fms., producing in all parts rich work for tin. Tributaries have offered to take pitches at 5s. in £1, and from its favourable position in respect to the neighbouring tin mines—the Ashburton United, West Beam, &c., &c.—the value of the property is greatly enhanced.

The Smallcombe estate comprises about 200 acres, the surface value of which, exclusive of the minerals, is estimated at £3000. It is well supplied with water, and is surrounded by good roads.

It is an important feature that this property being freehold is exempt from royalties, rents, or surface damages.

The assays and analyses of the ores by Mr. Mitchell, F.C.S., are as follows:—

THE ATLAS.	THE HERCULES.
Peroxide of iron .....	94.285
Protoxide of iron .....	77.785
Oxide of manganese .....	124
Alumina .....	1.972
Magnesia .....	100
Lime .....	traces
Potash .....	traces
Soda .....	traces
Phosphorus .....	885
Sulphur .....	1.420
Silica .....	17.057
Water and loss .....	145=100.000
Or 60 per cent. of metallic iron.	Or 66 per cent. of metallic iron.

THE HERCULES IRON MINE.  
This mine is situated in the Dartmoor granite range, three miles north of Atlas, and comprises 100 acres, held under lease for 21 years, at an annual rent of £120, to merge into a royalty of 6d. per ton. The iron lode on this estate has been proved, at a great cost, for a distance of 400 fms., laying open, above the adit, about 180,000 tons of the rich crystalline hematite, known as Specular Iron, highly prized for the manufacture of steel. There are also large quantities of the hydrous crystalline variety, or shining ore. Several thousands of tons of this ore have been sold at 14s. 6d. per ton, and a large quantity of the shining ore at 60s. per ton. The shining ore is also in demand as a lubricant in combination with grease.

THE PHOENIX IRON MINE  
Is situated in the northern part of Cornwall, within three miles of the town of Wadebridge, and within 500 yards of a navigable creek of the Padstow estuary. It comprises 50 acres, held under a lease for 21 years from February, 1859. The lode is from 12 to 15 ft. wide, can be traced through the set, and is the same as now worked in the neighbouring Pawton Iron Mine.

The following assay is by Mr. Edward Riley, late Analytical and Consulting Chemist the Devonshire Iron Company:—MARCH, 1859: Sample of Phoenix Iron Ore gave 58 per cent. of metallic iron.

THE WHARF  
Is at the head of the Stover Canal, in immediate connexion with the River Teign, near the port of Teignmouth, and is the shipping place for the Atlas and Hercules ores. There wharfage for 5000 tons of ore, and the buildings and plant include counting-house, stables, storehouse, and weigh-bridge. The entire cost of removing the ore from the wharf and carrying it (by lighters) to Teignmouth, and shipping it, is 1s. 4d. per ton.

CARRIAGE.  
Hitherto the cost of conveyance to the wharf has been 3s. 6d. per ton, but arrangements are now being made whereby it is expected it will be reduced to less than 1s. The estimate for raising, and all incidental expenses, may be calculated as follows:—

ATLAS MINE.	HERCULES MINE.
Royalty .....	none
Lifting to wharf .....	1s. 3d.
Carriage to wharf .....	1s. 0d.
Lighterage and shipping .....	1s. 0d.
Freight .....	3s. 0d.
Incidental expenses .....	0s. 11d.=7s. 6d.
This ore has been selling at 14s. 6d. per ton; the present selling price is 13s., showing a profit of 5s. 6d., or upon 500 tons per week an annual profit of £6875.	This ore is of a very pure character and high percentage, and sells at 14s. 6d. per ton, showing a profit of 4s. 9d., or upon 300 tons per week an annual profit of £552.

PHOENIX MINE.  
Royalty ..... 0s. 6d. || Raising ..... | 0s. 6d. |
Shipping .....	1s. 0d.
Freight .....	3s. 0d.
Incidental expenses .....	1s. 0d.=8s. 6d.
This ore will realise 14s. per ton, yielding a profit of 5s. 6d., or upon 300 tons per week an annual profit of £4125.	

Smallcombe tin lodes.  
The rate of 16 per cent. upon the full capital. Independently of this there will be profits arising from the tin lodes, as an indication of the value of which tributaries have been taken pitches at 5s. in £1; and as there are some thousands of tons of rich tin in sight it is fair to presume the profits from this source also will be very large.

GENERAL REMARKS.  
The above properties are in active working order with several contracts, which will be added over to the company.  
From the foregoing estimates it will be seen that the profit from the iron ore alone will be at the rate of 16 per cent. upon the full capital. Independently of this there will be profits arising from the tin lodes, as an indication of the value of which tributaries have been taken pitches at 5s. in £1; and as there are some thousands of tons of rich tin in sight it is fair to presume the profits from this source also will be very large.

It will be seen from the report of Mr. Joseph H. Hitchens, the discoverer of the Devon Great Consols, East Russell, Hington Down, and many others of the most successful, that the working of this lode will produce a large revenue, there being some thousands of tons of rich tin in sight. The recommendations of the consulting engineer, and the other inspecting agents, whose reports are annexed, will be carried out by the immediate erection of steam-stamps, so that returns may be made forthwith.

show the confidence of the vendors in the success of the undertaking, they have subscribed for a large proportion of the capital.  
It is contemplated, subject to the sanction of the shareholders, gradually to extend the operations of the company by the acquisition of other mineral estates. A portion only

of the present capital being required for working the above properties, an ample fund will be left for the purchase and development of other mines.

The company is formed with limited liability.  
Applications for shares must be made in the annexed form. Each applicant will be required to pay to the bankers of the company 5s. per share on the number of shares applied for, and on allotment a further sum of 5s. per share. In case no allotment is made, the deposit will be forthwith returned in full.

Prospectuses, mining reports, and forms of application for shares, may be had of Messrs. CARDEN and WHITEHEAD, London, brokers to the company; at the City Bank; at the various Branches of the Devon and Cornwall Bank; or at the offices of the company, where plans of the properties may be seen, and every information obtained.

Tavistock, March 12, 1859.—I have carefully inspected your mining property of Smallcombe, in the parish of Hington, in the county of Devon. The property is situated on the southern slope of the well-known Heytor range, on which some of the most profitably productive mines of Cornwall and Devon have been realised. Your agents have been almost exclusively engaged in preliminarily opening out the character, promise, and probable capabilities of a so far satisfactorily proved good deposit of iron ore, and a large and undoubtedly very promising tin lode—considered in conjunction with the east and west lodes crossing it. I shall first direct your attention to the iron ore deposit, which has been laid open direct from the surface for many fathoms in extent, but not to any greater depth for the most part than a few fathoms. It is very evident that this deposit is altogether of considerable thickness, including its several accompanying parallel layers, some of which, however, are too much intermixed with clay (decomposed argillaceous clay rock), and too largely composed of small ore to allow of the whole of their produce being sent to market. It is to the large solid and, indeed, the main layers that you must look for the great bulk of your returns. These workings (technically termed "open cast") have laid open a very abundantly productive deposit of iron ore, and one that will admit of being quickly and effectively brought into operation at a comparatively small expenditure of money, so as to ensure a permanently commensurate return of profit, there cannot be any doubt. I could not but feel additional confidence in the opinions I have just expressed, from seeing the important fact recorded in your books at the office that you have raised upwards of 3000 tons of ore from this deposit within the last four months, and that the same had been sent to market, and realised an average price of 13s. 6d. per ton. Your sett will command the working of this iron ore deposit, or, of course, for an extent of more than 300 fms. It is satisfactory to know that you have not been paying more than 3s. 6d. per ton for the cartage of your ore to the wharf on the canal, 1s. 6d. per ton for lighterage and putting on board vessels at Teignmouth, and 3s. freight to the iron smelting works. Under the various foregoing favourable circumstances, your mining operations, on being carried out on a judiciously large scale, and with a sound practical economy, will, I entertain no doubt, be attended with satisfactorily profitable results. It now devolves on me to direct your attention to the undoubtedly more than usually promising large gossan back, and so far, tiny lode which you have discovered and laid open in your sett, at about 160 fms. only from your iron mine, which will admit of both concerns being effectually and advantageously worked by the same engines and other requisite machinery. I was pleased to find you possess an extensive sett (comprising about 200 acres), and I was also afforded much additional satisfaction on being informed by your chief manager that it is your freehold property, which consequently exempts you from the payment of any dues. Your operations will involve no other than the ordinary mining mechanical arrangements, means, and appliances generally. The large gossan back, which did not fail to command much of my attention, is certainly 6 feet wide, composed of most beautiful looking and (as I think) very desirably constituted gossan, generally being also sufficiently quartzose, much of which is in such a state of minute crystallisation, and so intermixed with prisms, as argues very favourably for the results to be realised by deeper trials on this particular lode, and the other east and west lodes crossing about this very interesting and, likely to prove, very valuable portion of your property. Altogether considered, I may confidently assert that these lodes are of great promise, and, at the same time, I feel no hesitation in saying that I believe they will begin to open out profitably at no much greater depth than your present deepest operations on them—that is to say, 10 fathoms. This fine gossan back has been opened on for about 50 fms. in length, and I was told that for the most part of that distance it had been found to produce tolerably good paying work for tin; and also that particular portions of this lode had been found to produce excellent work for tin, not only this lode, but also the other chief east and west crossing lodes. I have much satisfaction in saying that the many samples I have tried (named) myself, while at the mine, fully corroborated these statements, and whether this large gossan lode, the lineal course of which is pretty nearly northerly and southerly, and, therefore, differing in that particular respect with the usual run of the majority of tin and copper lodes, is to prove a regularly productive lode for any very great length or not, it certainly does present very strong evidence in favour of its being a productive lode, together with the other lodes, for a desirable extent, but more particularly about the points at which they will intersect each other. I recommend your devoting your best attention immediately to these lodes, with a view to the quickest possible realisation of returns. There are, no doubt, other important objects within the limits of your extensive sett. It is satisfactory that your mines are not many miles distant from a canal to Teignmouth—a sufficiently commodious shipping port, and that, therefore, there will be a desirable cheap transit of your mineral produce, and the back carriage of materials required for the purposes of your mines will form but a comparatively easy item in your cost-sheets. In conclusion, from the more than probable value of your mining property, and the many facilities and advantages which it commands, I calculate on its proving a permanently profitable investment, on being carried out in a judiciously systematic and vigorous manner, and also with sound practical economy; in proof of which I shall have no objection to recommend your undertaking to my friends and contacts, and to adventure in the same myself to the extent that my pecuniary means will justify.

To the Atlas Mining Company.  
J. H. HITCHINS.

ATLAS TIN MINE, IN THE PARISH OF HINGTON, DEVON.  
London, Dec. 29, 1858.—I have the pleasure to inform you of the extensive and valuable mineral property. This estate is situated on the southern slope of the Heytor granite range, just on the junction of the kyllas or clay-slate; two lodes have been opened on at a shallow depth. No. 1, or Warren's tin lode, is full 6 ft. wide; the bearings are about north and south, dipping east; a shaft is sunk on this lode; the shaft has gone through this lode about 4 fms. deep, leaving the lode at its full size in the shaft; this lode has a very desirable feature, and sufficient to guarantee this as a mine of great promise. This lode is large and fine, composed of blue and light capel, and carries two good walls; between the capels are decomposed sandy granite, quartz, and red oxide of iron, with decomposed grey slate; the whole lode is carrying tin. At this shallow depth I saw samples of tinstuff taken from different parts of the lode bruised down; splendid walls of tin were the result; in fact, the whole lode is good work for tin. I saw the full size of the lode in the shaft. The men informed me that the shaft was from 7 to 8 fms. deep; a crosscut is driven from the bottom of the shaft east, and intersected the lode, which is more settled; the capel carries splendid leaders of tin of a very rich quality; the lode at this depth produces good vans of tin. No. 2, or Sun lode, is a caunter lode, bearing about south-east; a shaft has been sunk about 10 fms.; the lode is about 18 in. wide, with a solid branch of tin; good vans of tin in the remainder part of the lode; this lode crosses the large lode about 10 fms. north of No. 1 lode at the junction; on the back close to surface large stones of solid tin are raised. The stones of tin which I produce came from this lode. Other lodes are crossing the estate. The backs of the lodes mentioned are opened for a considerable distance, with tin in the smalls similar to stream tin; in fact, I never saw such tin backs in all my experience, which I have no hesitation in saying, judging from the appearances of the two lodes, and the open workings on the backs, must have paid the ancients well, from the appearance of the remains of their extensive workings. I should advise an engine and stamps to be put to work on the large lode; good returns can be made forthwith. The stratum is fair and easy for working. An adit can be driven the course of the lode, which will come in the shaft of No. 1 lode at from 25 to 30 fms. deep; this will give thousands of pounds worth of tin backs. Sufficient water for dressing purposes is obtainable at all seasons of the year. J. BENNETT.

Whitelegg Cottage, near Plymouth, March 9, 1859.—The mines I have surveyed are situated in the parish of Hington, Devon; the sett is very extensive, being about 200 acres of freehold land, known by the name of Smallcombe estate. At present there are two well-known lodes, and I propose to designate them Nos. 1 and 2 by way of distinction. No. 1, the iron ore lode, is upwards of half a mile in length, and is about 100 ft. wide. The lode is about 10 fms. deep, and is from 6 to 7 ft. deep for about 30 to 40 land yards over, and down to a depth of about 16 ft., from which 3000 tons of iron ore have been raised and sold, which gave a produce of 50 to 60 per cent. I am fully convinced that at a deeper point and further to hill a solid bit of iron will be met with. The cost of raising, cartage, and shipping is 6s. 10d. per ton, and after all expenses are paid (horse hire, agencies, &c.), I calculate that it will leave a profit of from 4s. to 5s. per ton, which will be a very handsome profit, as the returns will be very large. I have no hesitation in saying that with good management, economy, and experience in opening the lode, this part of the property will yield a good revenue.—No. 2 Lode: This lode is termed Warren's tin lode; it is about 6 ft. wide, and has been opened for about 50 fms. on the back, the deepest point about 8 fms. At this, and at every other point where seen, it has produced, and is still producing, fair quality tinstuff, which will pay well for stamping. The length of ground on this lode is upwards of a mile; going north it enters the granite. At this junction I am of opinion that large deposits of tin will be met with, as also at the junction with the iron lode, by which it will be perceived by the map that the tin lode is a caunter to the iron ore lode, and runs direct through it. There is now at surface a large quantity of tinstuff that would pay for stamping. There is water sufficient running through the estate for all dressing purposes; but to develop both lodes effectually, and in a mining-like manner, it would be

requisite to erect a steam-engine, which would answer the several purposes of pumping the water, stamping, and drawing from the tin lode as well as from the iron lode. I have not estimated the cost of laying open the iron ore lode for good working order, nor the cost of the engine, its erection, &c., but will promptly do so if it be desired. If the works be carried out as above advised, the experience of nearly a quarter of a century on such matters warrants me in saying that profitable results to those concerned will accrue.  
J. HODGE, Inspecting Mining Engineer.

Bovey Tracey, March 7, 1859.—By your request I have carefully inspected Atlas Mine. My attention was first called to the iron ore, which I found to be very wide; such a mass of iron I never saw before. When I looked at the beautiful strata in which it was embedded, I concluded that, if properly developed, sixteen men could easily raise 300 tons per week, and the raising could be increased in proportion to the number of men employed. From the indications I saw on the course of the lode I should say it could be done for a great number of years. I was then called to look at the tin lode, and such a back of a lode can scarcely be met with in Devon or Cornwall. We took several vans from different parts of the lode, and found them very rich for tin. This lode runs the length of the sett, which is about a mile. The iron lode intersects this lode about the centre; the bearing of the lode is north-east and south-east from 15 to 20 degrees; and I believe a great quantity of tin can be returned, which will handsomely remunerate the adventurers, only from the back of the lode. In conclusion, I beg to say I believe it to be a very valuable property; nothing wanted but a spirited prosecution of the same.  
N. FAULL, Inspector of Mines.

Bodmin, March 3, 1859.—At your request I have inspected the Phoenix Mines, on the Carthew estate, and herewith beg to hand you my report. The north and south lode, crossing the road and showing itself in the bottom of the adjoining field, is a very strong and large lode, measuring, as seen at surface, from 12 to 15 ft. wide; this is in my opinion the old Pawton lode, and I am confirmed in that opinion from the fact of its carrying the same description of ore on the backs as that found at the old mine when first opened, and having the same underlay. You have facilities which few enjoy, and without which no iron mine can be prosecuted with a view to profitable result. In the first place, you can drive a level south on the course of the lode, and obtain from 40 to 50 fms. of backs, which will, at the same time, drain your mine, and give you plenty of scope for stopping away your ore. In addition to which, as you are only about 3/4 quarters of a mile from the water, you can lay down a tram through your own property, along the bottom to the water's edge, where there is a quay built for depositing the ore and shipping the same. As to the quality of the ore, I believe it to be of the very best description, being free from phosphorus and sulphur; and can only add, having worked in and superintended the working of iron mines for the last 20 years past, have never met with a property offering such rare facilities, and possessing such advantages as yours. Independently of yielding to the shareholders an obtain 40 or 50 fms. of backs, the advantages of which I need not enlarge on. You will not require any machinery for years to come, and with a small outlay you can lay down a tram to the river, where a ship can at any time be loaded to the greatest advantage. You have several lead lodes well worthy a trial, and upon which some work has been done; and, as you are so near to good mines of that description, they merit a good trial. You have at your command every prospect of success.  
EDWARD G. GEACH.

Fadstow, March 4, 1859.—I have inspected the Phoenix Mine, and should strongly recommend your opening at once upon the back of the north and south lode, crossing the road in the direction of the Pawton Mine, and I believe you will find this to be the same lode as the Pawton; the nature of the ground and country around, as well as its carrying the same kind of ore on the backs as the Pawton, confirms it. Should this turn out to be so, which I have no doubt but it is, Nature has given you every facility for working the thing in the cheapest possible way. You can, in the first place, drive in a level on the course of the lode, and obtain 40 or 50 fms. of backs, the advantages of which I need not enlarge on. You will not require any machinery for years to come, and with a small outlay you can lay down a tram to the river, where a ship can at any time be loaded to the greatest advantage. You have several lead lodes well worthy a trial, and upon which some work has been done; and, as you are so near to good mines of that description, they merit a good trial. You have at your command every prospect of success.  
JOHN HAM.

Several other reports, equally favourable, have been received.

### DEVON KAPUNDA COPPER AND SILVER-LEAD MINING COMPANY (LIMITED).

PARISH OF SOUTH SYDENHAM, COUNTY DEVON.

Capital £30,000, in 30,000 shares of £1 each.

A deposit of 5s. per share to be paid on application for shares, and 5s. per share within one month after allotment of shares.

With two calls, if required, of 5s. per share, at intervals of not less than three months, and with sixty days notice in each case.

DIRECTORS.

J. H. HITCHINS, Esq., Tavistock, Consulting Mining Engineer to the Devon Great Consols.

JOHN WILLIAMS, Esq., Highgate (Messrs. Nicholls, Williams, and Co., Bedford Iron-FREEDERICK HAMILTON, Esq., Gresham House, Old Broad-street, London, E.C.

CHARLES PAUL BECKLEY, Esq., Lansdowne-place, Russell-square.

SOLICITORS—Messrs. Symson and Co., 7, Golden-square, W.C.

BANKERS—City Bank, Threadneedle-street, London, E.C.

BROKERS—Messrs. Castello Brothers, 4, Cushion-court, Old Broad-street, E.C.; and 30, Regent-street, Waterloo-place, S.W.

SECRETARY (pro tem.)—Frederick Bell, Esq.

OFFICES.—WALBROOK HOUSE, 37, WALBROOK, LONDON, E.C.

#### PROSPECTUS.

The object of this company is to continue energetic workings on this valuable mineral property, which were suspended, and ultimately relinquished, in consequence of the monetary panic, and altered circumstances of several of the principal shareholders of the old Devon Kapunda Company, after an expenditure of upwards of £20,000 in the erection of a plant of most superior machinery, a dwelling-house for the agent, and all other necessary buildings of every description, and the general development of the property—all of which are available to the present company. The steam-engine is of 40 in. cylinder, with 10 ft. stroke.

Apartment from these facts, so well known to all connected with the district, it is no evidence of demerit that a mine should cease to be worked by the original adventurers; and, indeed, there are but few mines that have been commenced and carried on by the same association of shareholders to a successful and profitable issue. The Devon Great Consols, South Carndon, Phoenix, and most of the leading mines in the two western counties of Devon and Cornwall have yielded the returns of profit to others than those who first worked the respective properties.

This property is most advantageously situated on the banks of the Tamar, in the parish of South Sydenham, about 1 1/2 mile north of the celebrated Devon Great Consols Mines, which are now giving to the shareholders about £50,000 annually, and has realised, in actually paid dividends, a grand total of £700,000. It is in one of the richest and most extensive metalliferous districts in the kingdom. The lodes of the Devon Kapunda are parallel to those of the Devon Great Consols, and embedded in a similar stratification, highly congenial for the production of copper ore. Two of the lodes have been wrought to the depth of 50 fms. below the adit level, and will form a junction a few fathoms east of the present workings, and are evidently intersected at a short distance from this point by a cross-course, which by all practical miners is acknowledged to be one of the most certain conditions of success, and which the former company were pressing forward to attain when adverse circumstances compelled them reluctantly to stay their progress. At the point of junction of these lodes, in the 34 ft. level, rich stones of copper ore were met with, although the lodes had only just entered a new stratification.

Extensive drivings have been made at shallow levels on very promising lodes, producing bunches of ore at different points of fair average quality. On reaching the 50 ft. level, or present depth, the prospects were most cheering; and as the eastern ground, before alluded to, was the principal object in view, drivings were extended in that direction, both on the north and the south lodes, 38 fms. on the former, and 42 fms. on the latter, which averages from 2 1/2 to 3 ft. wide, composed of quartz, capel, punch, mangle in immense quantities, and stones of rich copper ore. The lode in the end of the eastern drivings on the south lode is of an extraordinary character—is "a strong masterly lode,"—containing copper ore of superior quality, and shows evidently that the workings are nearing a very important deposit. There are three shafts sunk—the engine-shaft, that is down to the 34 ft. level below the adit; the wharf-shaft, 50 fms.; and the trial-shaft, 20 fms. below the adit.

The plan shows the relative position of the Devon Kapunda in respect of other known mines; and the section of underground workings demonstrate very clearly that the former company were not inert in their efforts to realise the object they had in view. The property extends over an area of 130 acres, being about 700 fms. in length, and about 300 fms. in breadth. The lease is 21 years from Feb., 1850, with the right of renewal, without fine, or of taking a new lease forthwith for 21 years, at a royalty of 1-14th.

Many tons of rich silver-lead ore have been raised at the upper levels, but at the deeper levels the general character of the lode is changed from lead to copper ore. This alteration in the character of the lode is very important, and corresponds exactly with the change in the stratification, thus affording ample proof that there can be no reasonable doubt of the success of the undertaking.

Various reports from competent mining engineers and agents could be furnished as to the general capabilities of the property, but the accompanying letter from Mr. J. H. Hitchens, of the Devon Great Consols, than whom few can be better able to form a correct opinion of mining matters, more especially in a district with which he is so practical



cally acquainted, will be sufficient to show the value and importance of the property of the Devon Kapunda Mining Company.

**Tavistock, Aug. 16, 1858.**—DEAR SIR: From what I have before and frequently said to you as to the merits, inducements, and probabilities of success of this adventure you will have concluded that I entertain a favourable opinion of it, which indeed is the case.

The situation of the mine, geologically viewed, is very recommendable. It is in the same range of "kilaas" formation as the Devon Great Consols Mines, the history, progress, and unequalled results of which are now too well known to all the mining world to need more than a passing allusion. I am of opinion—that is to say, as in regard to the eastern portion of the set—that your exploratory trials will be in the true conducting metalliciferous "kilaas" (clay-slate) of the district; and it is to be observed that in none of the other differently constituted rock formations of this district have probably productive copper ore deposits been found.

By such valuable pre-requisites as metalliciferous channels, lodes, "coming in feeders," and collateral veins as are to be found within the range of this set, we are to be safely guided as the circumstances will admit of in making our mining trials, for there is the most universally admitted and completely conclusive evidence in proof of the fact that the richness of lodes depends on the constituent and composite character and quality of the strata in which they occur. It is of paramount importance to be well grounded in the knowledge of such valuable particulars, as the search for the metallic treasures of the earth will always be more or less attended with very considerable expense. I am pleased to find that you possess a sufficiently extensive set, and subject only to the payment of 1-14th royalty; and it is of very great importance that you have a powerful steam-engine, and all the other requisite machinery, means, and appliances for keeping the water in the mine effectually under control; and for all the other purposes of hauling, grinding, stamping, and finally rendering the ores marketable.

There are also at the mine a good whim, ropes, tackles, necessary store-houses, floors, &c., for all the necessary operations, dressing, &c.

What I would more particularly refer to and recommend is the expected junction of your lodes eastward about the cross-course, the beneficial influence of which is to be much relied on, more particularly in the congenial ground which prevails generally throughout this set.

You have also the great advantage, and indeed positive value, of your predecessors' great outlay of £20,000 in sinking shafts and erecting all the required machinery for the fullest possible development of the resources of the mine; the present depth of the trial already made being 50 fms. below the adit level. The principal object in view by the last company of adventurers was the proving of the lodes in the eastern part of the mine, which was unsatisfied by reason of the incompetency of some of the large shareholders. At the furthest point of development in the direction referred to (that is to say, eastward), I am assured by the late agent the lode never presented a more kindly and encouraging appearance, being generally from 2½ to 3 ft. wide, composed of maudie, spar, and some copper ore, altogether indicating very favourably for the results of the eastern ground.

It would seem from what the late agent so confidently asserts as in regard to the 50 fm. level east, on the south lode, that the prospects there are more particularly encouraging, and such as to induce the belief that the results of the further prosecution of that trial would prove highly successful. It is in this direction, indeed, that I advise your trials to be extended to the course of the lode for many fathoms, and is now approaching an important point—that is, the junction of two lodes. According to the present bearings of these lodes there are probably about 12 to 15 fms. more to drive before reaching the junction; and I consider there is a fair and reasonable prospect of a good deposit of ore being met with at the junction. Throughout the drive the lode presents a much better appearance than in the upper levels. A deeper level will no doubt lead to valuable discoveries. There are other parts of the mine of a promising character, and there is scarcely any doubt but it will prove a profitable and lasting mine.

The nominal capital of the company will be £20,000, in 20,000 shares, on which it is proposed to call 10s. per share, and beyond which, it is confidently expected, it will not be necessary to apply to the shareholders; but under any circumstances no call will exceed 5s. per share, nor be made at less intervals than three months, nor without giving sixty days' clear notice.

The purchase of the interests of the present holders of the lease and proprietors of the plant, buildings, &c., is £15,000, in equal portions of money and shares. The preliminary expenses for the formation of the company have also been agreed upon for the defined sum of 5 per cent. on the nominal capital.

Prospectuses, with map, section, &c., and forms of applications for shares may be obtained at the office of the company, or on application to the solicitors or brokers.

London, April 9, 1859.

I remain, your faithful servant, J. H. HITCHINS,

Mr. J. H. Hitchins has either introduced or recommended by reports, most of the mines in the Tavistock district which have proved remunerative, and the confidence of this gentleman in the Devon Kapunda is shown by his adhesion to the enterprise.

Capt. J. Cock, the agent of the mine, reports, under date of March 30, 1859, that the 50 fm. level, which was in course of driving east on the south lode, appears to be changing for the better; the ground is moderately easy, and favourable; the lode is about 2½ ft. wide, composed chiefly of spar and maudie, intermixed with good stones of copper ore, a box of which is herewith forwarded. The indications and character are highly encouraging. This level has been extended to the course of the lode for many fathoms, and is now approaching an important point—that is, the junction of two lodes. According to the present bearings of these lodes there are probably about 12 to 15 fms. more to drive before reaching the junction; and I consider there is a fair and reasonable prospect of a good deposit of ore being met with at the junction. Throughout the drive the lode presents a much better appearance than in the upper levels. A deeper level will no doubt lead to valuable discoveries. There are other parts of the mine of a promising character, and there is scarcely any doubt but it will prove a profitable and lasting mine.

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London, April 9, 1859.

in the speculation, if carried on in a spirited manner, together with judicious management.

**THOS. GILL**, late Mineral Agent to the Duchy of Cornwall.

The directors state that this company being registered under the Limited Liability Act, the shareholders are in no way responsible or liable, and can sustain no further loss than the money invested by them, being £1 per share, which may ultimately realise a considerable profit. The plan of this project will show the relative position of the two mines, Devon Great Consols and West Devon Consols; and, if any reliance can be placed upon the highly respectable agents, Messrs. Richards, Gill, Hitchins, and others, there can be no doubt that the West Devon Consols must be a good and lasting mine, and a profitable investment to the shareholders.

Applications for the remaining shares to be made to the secretary, 1, Great Winchester Street, Broad-street, E.C.

**THE SMELTING, REDUCTION, LIME, AND COAL COMPANY (LIMITED).**

Capital £20,000, in shares of £1 each. Deposit, 10s. per share.

**DIRECTORS.**  
WILLIAM PEACE, Esq., F.G.S., Wigan, Chairman.  
ISAIAH BOOTH, Esq., Manchester, Managing Director.  
JOHN HEELIS, Esq., Manchester.  
THOMAS GOODIER, Esq., Liverpool.  
FRANCIS LANGTON, Esq., Brighton.  
JOHN THOMPSON, Esq., M.A., Wigan.  
JOHN HINDLEY, Esq., Liverpool.  
JOSEPH WILSON, Esq., Liverpool.

**BANKERS.**—Messrs. J. Barnard and Co., Lord-street, Liverpool.  
**AUDITOR.**—James Wrenley, Esq., Gloucester-place, Liverpool.  
**SOLICITOR.**—Maskell W. Peace, Esq., Wigan.  
**SECRETARY.**—Mr. F. Owen.

**OFFICES.**—6, CASTLE STREET, LIVERPOOL.

The objects of the company are to carry on the working of coal, canal, and ironstone, smelting, and lime burning, and other operations in aid of the same.

The company have purchased a freehold estate at Mold, in Flintshire, 114 acres in extent, and also the leases of the coal, canal, and ironstone, existing under adjacent estates, comprising an additional area of about 300 acres, held upon favourable royalties for 21 and 25 years, from 1857.

These properties are advantageously situated at a distance of 29 miles from the large export markets of Liverpool and London, on the Mold branch railway, with which the company's works and collieries will be connected by a short line of a mile in length, of easy construction, over land already leased and purchased for the purpose.

Mr. Peace estimates that the estates of the company will yield from mines now and in work nearly 4,000,000 tons of coal, exclusive of additional seams of coal and ironstone which are referred to by Mr. Higson in a report made by him.

The quality is eminently adapted for smelting, steam, and other purposes, and is also particularly suitable for exportation, being similar in character with the Hartley coals of the North, and the demand for this description of coal is great and increasing.

The present shafts are being enlarged, new machinery is being put up, and preparations are being made for carrying on the colliery works on an extensive scale. Valuable lime is found in the immediate neighbourhood, leases of which are attainable by the company on advantageous terms.

In addition to the coal and lime, there exists in the freehold estate large deposits of ironstone, which can be profitably disposed of to the ironmasters of the neighbourhood.

The profits from smelting are generally very large, and the company anticipate considerable profits therefrom. The locality is suitable, as it abounds in lead and zinc ores, and possesses unusual facilities for conveyance by railway and for water carriage by the Dee and the Mersey.

In addition to the ores of the district, the promoters have made advantageous arrangements for the reception of consignments of foreign ores, samples of which have been tested in this country, and proved to be of rich quality.

The directors have fixed the present amount of capital at £20,000. From the reports of several experienced mining engineers, the directors are warranted in anticipating a profit on the capital embarked, at the rate of 30 per cent. per annum. The vendors of the collieries have accepted the purchase money in paid-up shares of the company, leaving only a limited number to be allotted, and for which the directors are prepared to receive applications up to the 14th next.

The company being under the Limited Liability Act, shareholders having paid up their shares in full are exonerated from all further liability.

In the case of shares being paid up in full, the company will allow interest at the rate of 5 per cent. per annum upon the balance paid up beyond the sum for the time being called for.

Application for the remaining shares must be made in the following form, and forwarded to the secretary, Mr. F. Owen, 6, Castle-street, Liverpool:—

To the Acting Directors of the Smelting, Reduction, Lime, and Coal Company (Limited).

GENTLEMEN.—I request you will allot me shares in the undertaking of the above company, and I hereby agree to accept the above number of shares, or any less number than may be allotted to me, and to pay a deposit of 10s. per share, at such time and place as may be appointed for that purpose in the letter of allotment, and that this application shall be taken as an acceptance by me of so many shares, not exceeding the number above-mentioned, as you may think fit to allot me.

Name in full.....  
Residence.....  
Profession, trade, or occupation.....

**WHEEL WHIDDON TIN AND COPPER MINE, ASHBURTON, DEVON.**

Conducted on the "COST-BOOK PRINCIPLE."  
In 2000 shares of £5 each. 10s. per share to be paid on allotment, and the remainder at periods of three months, by calls not exceeding 10s. per share.

The attention of bona fide mining investors is respectfully called to the plan adopted in the proposed working of this mine, which quite divests it of all speculation, the promoters contracting to put it in a productive state, and allowing their remuneration to be dependent on its success.

Prospectuses, containing proposals of working, and reports of Mr. N. Ennor, Capt. Hoeking, Hampton, Peall, Rickard, Skewis, and Faulk, speaking in the highest terms of the prospects, and other information, may be obtained of, and applications for shares made to, Messrs. SANDFORD and MORTIMER, Exeter; or Mr. J. K. THOMAS, Clare-street, Bristol; or Mr. J. THOMAS, Lostwithiel, Cornwall; or of the Purser, at the office of the company, Ashburton.

**SIDNEY COVE TIN AND COPPER MINE COMPANY (LIMITED).**

BREAGE, NEAR HELSTON, IN THE SOUTH-WEST OF CORNWALL.  
Incorporated by Act 19 and 20 Vict., cap. 47.  
Capital £15,000, in 8000 shares of £2 each, paid-up.

**BANKERS.**—Messrs. White and Co., Haymarket, S.W.  
**SOLICITOR.**—Mr. J. Stubbs, Esq., 46, Moorgate-street, E.C.  
**BROKER.**—Thos. Smith, Esq., Stock Exchange, and Cophall Chambers, Throgmorton-street, E.C.

**SECRETARY.**—Charles Pearson.

**OFFICES.**—9, NEW BROAD STREET, LONDON, E.C.

The favourable situation, exposition of ore, and other advantages, combine to render this one of the mineral prizes of Cornwall. Having been already profitably worked, and only discontinued on the death of the chief proprietor, the renewal of operations is entirely divested of risk. The ore from the shallow levels, only 8 and 16 fms. deep, contains from 15 to 20 per cent. of fine copper, and there are three lodes from which large quantities can be at once raised upon setting the mine to work again. Six of the oldest mining captains and surveyors of the neighbourhood, whose reports are given in the prospectus, have declared the certainty of success by creating a 60 to 70 in. cylinder engine, with necessary pumping and crushing gear. The lease is for 21 years, at only 1-18th royalty. The board of directors, as will be seen by the prospectus, is unexceptionable.

For further particulars, prospectuses, applications for shares, apply to the SECRETARY, at the office of the company; or to THOMAS SMITH, Esq., of the Stock Exchange, and Cophall Chambers, London, E.C.

**THEODOLITES, LEVELS, CIRCUMFERENCES, MATHEMATICAL DRAWING INSTRUMENTS, SCALES, RULES, TAPES, T SQUARES, &c.**—JOHN ARCHBUTT, 20, WESTMINSTER BRIDGE ROAD, LAMBETH, near Astley's Theatre, respectfully calls attention to his stock of the above articles, manufactured by superior workmen. The prices will be found considerably lower than elsewhere for articles of similar quality. An illustrated price list forwarded free on application: 10s. in duty free, complete, etc. 19 in. ditto, eight guineas; 14 in. ditto, ten guineas; with compass, one guinea each extra; best 5 in. theodolite, 14 in. ditto, ten guineas.

**MAPPIN'S ELECTRO-SILVER PLATE & TABLE CUTLERY.**

—MAPPIN BROTHERS (Manufacturers by Special Appointment to the Queen) are the only Sheffield makers who supply the consumer in London. Their London Show Rooms, 67 and 68, KING WILLIAM STREET, LONDON BRIDGE, contain by far the LARGEST STOCK OF ELECTRO-SILVER PLATE and TABLE CUTLERY in the world, which is transmitted direct from their manufactory, QUEEN'S CUTLERY WORKS, SHEFFIELD.

**Fiddle Plate. Double Thread. King's Pat. Lily Pat.**

12 Table Forks, best quality..... £1 16 0 .. £2 14 0 .. £3 0 0 .. £3 12 0  
12 Table Spoons, best quality..... £1 16 0 .. £2 14 0 .. £3 0 0 .. £3 12 0  
12 Dessert Forks, best quality..... £1 7 0 .. £2 0 0 .. £2 4 0 .. £2 14 0  
12 Dessert Spoons, best quality..... £1 7 0 .. £2 0 0 .. £2 4 0 .. £2 14 0  
12 Tea Spoons, best quality..... £1 6 0 .. £1 4 0 .. £1 7 0 .. £1 16 0  
2 Sauce Ladles, best quality..... £0 8 0 .. £0 10 0 .. £0 11 0 .. £0 13 0  
1 Gravy Spoon, best quality..... £0 7 0 .. £0 10 0 .. £0 11 0 .. £0 13 0  
4 Salt Spoons (gilt bowls), best quality..... £0 8 0 .. £0 10 0 .. £0 11 0 .. £0 13 0  
1 Mustard Spoon, best quality..... £0 1 8 .. £0 2 6 .. £0 3 0 .. £0 3 6  
1 Pair Sugar Tongs, best quality..... £0 3 0 .. £0 5 0 .. £0 6 0 .. £0 7 0  
1 Pair Fish Carvers, best quality..... £1 0 0 .. £1 10 0 .. £1 4 0 .. £1 8 0  
1 Butter Knife, best quality..... £0 8 0 .. £0 10 0 .. £0 11 0 .. £0 13 0  
1 Soup Ladle, best quality..... £0 12 0 .. £0 16 0 .. £0 17 0 .. £0 19 0  
6 Egg Spoons (gilt), best quality..... £0 10 0 .. £0 15 0 .. £0 18 0 .. £0 21 0

Complete Service..... £10 13 10 .. £15 16 6 .. £17 13 6 .. £21 4 6  
Any article can be had separately at the same prices.

One Set of Four Corner Dishes (forming eight dishes), £8 8s. One Set of Four Dish Covers (one 20 in., one 18 in., and two 14 in.), £10 10s.; Cruet Frame (four glass), 24s.; Full Size Tea and Coffee Service, £9 10s. A Costly Book of Engravings, with prices attached, sent post per receipt of 12 stamps.

Ord. qual. Medium qual. Best qual.  
Two dozen Full Size Table Knives, Ivory Handles..... £3 4 0 .. £3 6 0 .. £4 12 0  
1½ dozen Full Size Chisels..... £1 4 0 .. £1 6 0 .. £2 11 0  
One Pair Regular Meat Carvers..... £0 7 6 .. £0 11 0 .. £0 15 0  
One Pair Extra Sized ditto..... £0 8 6 .. £0 13 0 .. £0 16 0  
One Pair Poultry Carvers..... £0 7 6 .. £0 11 0 .. £0 15 0  
One Steel for Sharpening..... £0 3 0 .. £0 4 0 .. £0 6 0

Complete Service..... £4 16 0 .. £6 16 0 .. £9 16 0  
Messrs. MAPPIN'S table knives still maintain their unrivalled superiority; all their blades, being their own Sheffield manufacture, are of the very first quality, with secure ivory handles, which do not come loose in hot water, and the difference in price is occasioned solely by the superior quality and thickness of the ivory handles.

MAPPIN BROTHERS, 67 and 68, King William-street, City, London; Manufactory, Queen's Cutlery Works, Sheffield.

## SUCCESSFUL MINING ENTERPRISE.

Mr. Murchison, in his "Review of British Mining" for the past quarter, enters again fully into the subject of legitimate mining, and gives the following as a few illustrations of the success attendant on it:—

**CARN BREA** was worked down to the 120 fm. level for 20 years or more, under the name of Wheel Fanny. For want of effective machinery, and the then poverty of the mine, after a long period of working without profit, it was abandoned about the year 1835. Wheel Fanny was also worked by another company, with insufficient machinery for a long time, and was abandoned about the year 1830. Burncoose was worked by another company for several years, and abandoned some 40 years ago. These three mines are included in the present Carn Brea set, and have been worked with proper spirit and ample machinery for the last 25 years, with a profit of about 250,000, still returning large quantities of tin and copper, and paying dividends.

**SOUTH WHEEL BASSET** was originally worked on a limited scale, to about the 80 fm. level, for want of sufficient funds, for a period of 10 to 12 years, and abandoned about the year 1836. Shortly afterwards it was purchased, with the machinery, for 6000, or 7000, a discovery made, and 20,000 divided. At the same time, Wheel Basset was partially worked; and by the time the South Mine became poor, a good discovery was made at the "North Mine" (then so called, and now the Wheel Basset), at a shaft called "Straker's," which, through the aid of ample machinery, and under judicious practical management, has given dividends to the amount of about 250,000. The original part of the set (South Wheel Basset) is now worked as a separate mine under the same management, with the expectation of again becoming profitable in deeper levels.

**WEST BASSET** was worked down to the 60 fm. level by Capt. William Richards (the present able manager of Wheel Basset) without success, even scarcely selling any ore. The constant calls, for several years in succession, so discouraged the adventurers, that in 1847 the manager could not collect the funds for carrying on the mine, and though he himself had not lost confidence in the results, the operations were necessarily suspended. Capt. Richards recommended the set to the shareholders in a neighbouring mine, but they declined it, and the mine, with the machinery and materials, was sold to the present company for about 7000, who, upon an outlay of 9000, have divided 90,000, and the mine of the market value of more than 120,000.

**SOUTH WHEEL FRANCIS** was worked with a horse-engine to 10 or 15 fathoms below the adit, and then abandoned, about 40 years ago. The workings were resumed with steam machinery about the year 1840, and the profits realised in the last 15 years amount to 160,000, and the mine of the market value of 100,000.

**TREASAVAN** made ore very shallow, which held down to the 50 or 60 fm. level under adit, when a poor floor of ground came in, and the mine was abandoned. The operations were afterwards resumed by another company, who worked to the 100 fm. level, when it became a question whether they would drain the old mine, or abandon the concern. In the 100 fm. level there was a little ore in places for 100 fms. long, but generally poor. In sinking about 10 fms. deeper, these shoots of ore lengthened, and ultimately in depth, at the 166 fm. level, made a run of ore nearly 20 fathoms long, and worth in places 2000 per fathom; and the concern has paid in dividends 500,000. This mine has now been abandoned three or four times.

**EAST WHEEL ROSE** was at work for some years before the ore was discovered, which gave 300,000, in dividends.

**WHEEL SETON** was worked at a loss for seven years before it became a good paying mine.

**WEST WHEEL SETON** was very poor, and was worked at a loss for seven or eight years, and is now one of the richest mines in Cornwall, having already paid 60,000, and increasing its profits.

**EAST CROFTY** was an old mine resumed, and was very poor for some time, but subsequently became very rich, and continued so for several years.

**TINCROFT** was also resumed, after being suspended for some time, and has since paid a good sum.

**BOTALACK** was an old mine resumed, and the new company almost again abandoned it, some of the shareholders having relinquished their shares. A general meeting, however, decided on giving it three months' further trial; and during that time the rich band of grey copper ore was cut in the 84 fm. level, which raised the shares to 11000, per 100th, and has given the large profits since.



## THE IRON TRADE, AND MR. S. B. ROGERS.

In our remarks on Mr. ROGERS's labours for the improvement of the iron manufacture we referred to two great improvements already carried out, and six proposed, but these include many minor improvements, and a mass of inventions; and, indeed, in that very Journal Mr. ROGERS gave further evidence of his zeal on the subject by calling attention to the observations he had published on the alloys of iron and aluminium in the production of steel. We shall now proceed to explain Mr. ROGERS's plan more in detail, and we do so with the more confidence because, while some other branches of metallurgy have remained comparatively stationary, the iron manufacture has undergone great changes, because the spirit of monopoly has been less tenacious; for although at times certain great firms have been able to grasp the bar-iron trade, yet the manufacture is so vast as to allow great scope for enterprise. Thus, by the exertions of the men we have named, as well as of the capitalists, many changes have taken place in each half century in the whole processes of the iron and steel manufacture; and thus in so far the history of invention will be found to present in this branch results different from the others; for whereas numerous patents have been taken out for copper, tin, and lead smelting, and they remain as waste paper, yet of the numerous patents for iron and steel many are in activity, many have been profitable, and many of those which have failed have failed through the competition of other inventors, and not through the inactivity of capitalists. Nevertheless, we cannot for the reasons we have given altogether congratulate the members of the iron trade on their conduct; and we should be glad to do so, for a very little exertion would in some degree redeem their character. An addition to the *Cort* still lives, and some general or individual exertion for putting the inventions of Mr. S. B. ROGERS in practice, would be acts by which the public would judge honourably of the ironmasters.

As to the English Government, we are too well aware that there is no hope from an appeal to them. The United States Government has contributed funds for electro-magnetic engines, Russia for other scientific objects, and the French Emperor for the improvements in aluminium, sodium, and silicon of Mr. H. ST. CLAIR DEVILLE. The East Indian Government has spent much on cotton-cleaning machinery; even the little Government of New Zealand have offered premiums for the improvement of the *phosphorus tenax*; but the Imperial Government has other cares. Even at this moment, when good iron and steel are of the greatest importance for shipping, ordnance, rifles, sabres, anchors, cables, ropes, and rigging, our Government would not advance 5000*l.*, or 5000 farthings, to ROBERT MURPHY or Mr. S. B. ROGERS for iron experiments, though we should not be surprised if some German were to profess to make steel out of hazelnuts that means would be found of spending money from one source or another. One subject of Mr. ROGERS's improvements is, as we have mentioned, to work blast-furnaces with new fluxes, and prepared furnace mixtures. The promise he holds out is to obtain from 15 to 20 per cent. better yield of pig-iron, an object of very great importance; because, although iron ores are plentiful, yet the best ores are not the most abundant, and the effect of obtaining 15 to 20 per cent. more produce from the same mine or ore is to economise labour and the means of transport, so far as the raw material is concerned; and what is of more national importance, to economise the fuel used in mining, haulage, and smelting. Mr. ROGERS says that from furnaces making at present 100 tons per week, he could obtain 20 tons more per week, or 1000 tons per annum, and of much better quality than is obtained from working with a black cinder.

The importance of this improvement will take the trouble to speculate upon. We will not assume that Mr. ROGERS's system is applicable to all the iron-works in the island using various materials, but only a considerable portion; and we may then fairly calculate that the increase of produce will be not less than 200,000 tons of pig-iron per year, worth, say, half a million, a greater yield than that of many iron-making countries of Europe. This would be a clear addition to the national gain without any extra expenditure. Surely there ought to be some real Board of Trade, something in the nature of the old Board of Longitude, to which a practical and well-accredited man, like Mr. ROGERS, might submit such a proposition with the expectation of encouragement.

According to Mr. ROGERS, the aggregate loss of iron arising from the wasteful system of smelting with a black cinder is in Monmouthshire and South Wales truly enormous, exclusive of the losses and disappointments in the mills and forges from the production of white and sulphury pig-iron; whereas, by the new method of working high smelting furnaces with the proposed prepared mines and fluxes, all operations would be placed under complete control, as well as to quality as quantity of results. Mr. ROGERS is of opinion that the furnace cinders thus obtained may wholly or partially be economically converted into a variety of useful building and ornamental materials, and the gases may by one of the other inventions enumerated be applied to many new purposes, whereby a great economy would be effected in the consumption of fuel. In such a process 3,000,000 cubic feet of gas are produced per day from a furnace taking 1000 feet of blast per minute. The cinders from the new smelting cupolas, melting fires, and puddling furnaces, and also all lime, coke, and limestone, and refuse from puddling and balling fires, will be advantageously worked up in the high-blast furnaces. Hence there would be no residuum of cinder about a reformed iron-works if Mr. ROGERS's views prove correct. His second series of processes is for smelting pig-iron with a soft blast, or about one-half the pressure per square inch, in small cupolas, to the extent of 80 to 100 tons per week per cupola; the mine to be used in these cupolas to be prepared, and the iron partly refined in cementing, to be heated with part of the gases from the smelting cupolas, and the cinder from these cupolas will be found a more efficient flux in high-blast furnaces four times over the limestone. The blast of 8000 feet per minute per cupola may be obtained by means of fans, or by cylinders *ad libitum*. These cupolas would work up black-band limestone without heating, either *per se*, or in mixture with spathose, magnetic, or mangano-ous ores. Mr. ROGERS has an idea of using stone coal fuel in these cupolas.

Mr. ROGERS's third series is a new method of refining pig-iron, by which iron of semi-malleable iron or steel, a kind of amorphous or homogeneous metal. The yield of iron in this process will be retained, or made up, by the admixture with the pig-iron of cemented rich ores; and all the unrefined iron would be absorbed in the cinder, and also the fluxes made use of.

As such cinder, being rich and tractable, could be worked up with facility and economy in high-blast furnaces, there would be no waste metal in this process.

His fourth series of operations is devoted to puddling the improved metal pig-iron with a flux that should produce a ton of puddled bar or steel in a ton of metal or pig-iron, and that should at the same time correct all effects arising from what are termed the red or cold short properties of iron, and speedily bring the several heats into nature. The cinders from these furnaces, again, will be available, and will work well in the smelting process.

In the fifth series are applied the gases from the smelting furnaces cupolas, not only for raising steam and generating a hot blast, but for working mine, lime and brick-kilns, and stoves, and for puddling furnaces, and forges and pumping-engines, and many other purposes for which coal gas is consumed. This Mr. ROGERS affirms he can effect with the greatest facility and economy. These gases he proposes to take from the tops of the smelting furnaces in such a way as not to interfere in the least with the working.

It will be observed in this and other parts of his operations Mr. ROGERS directs attention to the utilisation of the waste gases from the furnaces, of great importance, and to which we alluded when speaking of the *St. Just* district. The practicability of this has been proved in the iron districts of France, Belgium, and Prussia, and many valuable memoirs have been published on it, and of late years it has been successfully applied in South Wales. The gases can be economised, and the reduction of the ore can be effected without prejudice; and when this system is applied it will be the means of saving millions of tons of fuel, another great national importance, which we should be glad to commend to the Government, if we knew any department whose duty it is to economise the national resources, though we do not know many departments whose duty seems to be to annihilate our resources. How fearful is the waste of iron, timber, hemp, biscuit and meat in our dockyards and arsenals, and how many men are kept for undoing work, and where a man-of-war rots before it is launched, and the crews are supplied with shrivelled and unwholesome provisions, the nutriment whereof has long since been lost. France compels the world to obtain coal or iron fields to produce the quan-

ties of iron and coal which Mr. ROGERS offers to save, and could he endow France with such treasures, commissions of the Academy of Sciences and of the Mining Engineers would be sent to investigate his discoveries, and not to investigate and criticise, like an English Admiralty or Ordnance committee, for the purpose of swamping his plans, but with the express view of assisting them, and of supplying his deficiencies. Funds would be at his disposal, and every ironmaster would be encouraged to profit by such valuable inventions.

We may briefly repeat that what Mr. ROGERS offers to effect, and what there is as much reason to believe he can effect as that there is gold to be got in Columbia, is to endow us with the equivalent of a great iron district, as large as one of our famous iron districts, and with the equivalent of a great coal basin, which would figure on the map of Europe, and would make a considerable nation powerful and independent. Holland, Portugal, Denmark, Naples, or Sardinia, would dearly cherish such wealth. We, by the great mercy of Providence, are too rich, and are, therefore, wasteful and negligent.

Mr. ROGERS's sixth proposition is in some respects connected with the preceding, for he therein contemplates the lighting of an entire iron-works with gas, free of expense, except the gas mains, service pipes, and other plant. The gas is stated to be obtained from a new arrangement of coke ovens, which will produce coke in any quantity, both economically and of good quality. Here again we have subsidiary evidence of the general practicability of Mr. ROGERS's propositions, and here, again, we come to another dark chapter in the history of invention. Let the reader carry his memory back some 30 years or more, or let the younger men, who cannot do so, refer to any standard work, and foremost among those practical inventions of promise in the generation before this is the gas-engine of Mr. SAMUEL BROWN—not Sir SAMUEL BROWN, the chain cable and chain pier inventor, but a contemporary engineer of great renown. The gas-engines were not paper inventions, but machines which worked many years, and at a time when the production and management of gas were by no means so well understood. The gas-engines were worked in several shapes, as stationary engines and marine engines, and one of the first screw-propellers was a small boat belonging to Brown's Gas-Engine Company, which was worked on the Thames. The Gas-Engine Company fell to the ground for want of more funds in the dreary times which succeeded the great panic of 1825-6, when many a valuable undertaking was lost, but BROWN, to the day of his death, laboured at the engine, and it may be remembered one of his old engines was employed in draining the Croydon Canal on its conversion into a railway. This engine converted the coal into coke, used the gas for working the pumping-engine, and delivered the coke for sale. BROWN had, however, a little genius for getting into squabbles, and the Croydon directors having an especial turn for litigation, mutual discontent arose, ending with a lawsuit, in which BROWN obtained a verdict, but was, in fact, disappointed of the real objects of his enterprise. It was chiefly in consequence of this unfortunate litigation that BROWN lost the drainage of the Haarlem Meer, which was effected by steam, but the propositions of BROWN were seriously entertained, as presenting a source of economy and profit very tempting to the Hollanders, and had his engine been tried and succeeded it would have had a material influence on the application of gas as a source of power. At present in our coke-works, which are carried on upon a large scale, the loss of the gases is very great. We believe the railway station at New Cross, and a great part of the adjoining railways and roads, might, by careful arrangement, be lighted with the gases which at night are seen glaring from the railway coke ovens. Before leaving the name of SAMUEL BROWN, we may observe that the metallic cask manufacture, carried on in London, is one legacy which we already enjoy, and the gas-engine we ought to reclaim.

Mr. ROGERS's application of gas is of several kinds, availing himself of the physical properties of the various gases, as a means of communicating heat, exhibiting light, and obtaining a motive-power. The chief application of the waste or spare gases in iron-works hitherto has been for the purpose of communicating heat, but Mr. ROGERS contemplates the application of the gases on an extensive scale. Thus he would by means of the gases light the works, obtain a hot blast, heat the mine or ore, lime and brick kilns and stoves, and the puddling-furnaces, and work the mill, forge, and pumping-engines, all of which are sources of economy, all of them are in the main practicable and approved by experience, and, indeed, what Mr. ROGERS offers us is the application and extension of existing resources. We have preferred to show these results in a national point of view, that our readers generally may appreciate their importance, but they affect each individual ironmaster to a corresponding extent; it is they who are to reap these fruits in the aggregate, and we put it strongly to them that they should early profit by these advantages, and give Mr. ROGERS the only opportunity which time will offer of witnessing the success, and having hand-ful of their good fortune.

## HOW TO ENSURE SUCCESS IN MINING.

BY CAPT. CHARLES THOMAS, OF DOLCOATH.\*

There are three great leading features in profitable mining phenomena—the geological character of the locality, the general appearance, contents, and size of the lodes, and their bearing or direction. The facts respecting these have been so uniform within the sphere of my observation that I have adopted them as rules, and my experience has furnished no exception to similar results where these three features unite.

1. AS TO THE GEOLOGICAL CHARACTER.—And here it is more easy to say, definitely, in what strata a profitable mine will not be found, than to say where it will. Hitherto no profitable mine has been found for tin, lead, or copper in what I distinguish by the term primitive granite. This is commonly known here by the name of moorstone, and to the west of Hayle another variety of it is usually called whetstone. It is hard and compact, and may generally be cleft in straight lines, as we see it used for building purposes. It is found in most of our hills with projecting tops, such as Carn Marth, Carn Menellis, Carn Brea, Carn Etrai, the highest of the western hills, the Caradon Hills, Kit Hill, Boughor, and Brown Willey. It is commonly found, too, in the central parts of granite districts, even where there are no projecting tops, at no great depth below the surface. The eastern part of Crowan, a large portion of Stithians, Mabe, Bodmin Down, and Dartmoor are granite districts of this character. At the sides and flat bases of such hills, as well as in the hollows between high hills, and the margins of granite districts, another kind of granite is commonly found which I shall notice hereafter. In this primitive granite no mine of any kind, yielding a profit, has hitherto been discovered. It may be a good substratum, but other strata must be found for profitable mining. No tin mine, yielding a profit, has hitherto been found except in what I call secondary granite, or in very quartzose or micaceous clay-slates, connected or unconnected with elvan. This kind of granite, which I distinguish as secondary granite, is generally coarse grained, jointy, and the fracture so irregular that it would be difficult to get a common post of much length out of it. It varies in colour, and is either very white, dark, or reddish. It also varies considerably in hardness, but may always be distinguished from the primitive granite by its very uneven fracture. Copper ores are much more extensively diffused, and good mines of this metal have been found in secondary granite, compact clay-slates (killas), of various colours when granular and containing a large portion of felspar, and in greenstone (ironstone). Lodes in dark-coloured killas are most productive when above, passing through, or a little below elvan courses. At much depth below the elvan they are seldom rich, unless another elvan course, or granite, be situated below it still. The muddy white killas, and the blue and black killas, containing a small portion of felspar, unconnected with elvan or granite, may furnish good specimens of ore; but no mine yielding a profit has been found in them. No copper mine is found in shelling, roofing, or paving slate. Lead, in large quantities, is found in comparatively soft-blue or dark clay-slate containing a large portion of alumina. In strata yielding tin and copper small quantities of lead are sometimes found, but never sufficient to pay for working.

2. THE CHARACTER, SIZE, AND COMPOSITION OF THE LODE.—Long experience in this department of mining seems absolutely requisite. The experienced eye, at a single glance, judges more accurately than an inexperienced person can do after the most laboured investigation and analysis. A good gossan of a fair size, the old guide of the miner, is an excellent one, and almost a certain one for ores not far below the surface. The ores, however, are not always found immediately below the gossan, but sometimes at a good distance east or west of it. In commencing a mine, therefore, gossan is one of the best guides a miner can follow; but at greater depths other guides will be wanted, as vast quantities of ore are found there with but little gossan near the surface immediately above it. I here caution the young miner against a deception very common in our day of calling almost every substance of a reddish colour, found in the back of lodes gossan. The present race of young miners have had comparatively little to do with the backs of lodes; and although gossan still retains its high character as a guide to a rich mine, very few of them really know what gossan is. Verbal description will convey but very little information on this matter. My advice is to collect specimens from the backs of our rich lodes, and compare them with the reddish substance taken from worthless speculations, so often palmed upon the credulous public as real gossan. Real gossan contains friable quartz in considerable portions.

3. THE DIRECTION OR BEARING OF THE LODE IN YOUR SET.—This is of greater importance than is generally supposed. Where the direction is wrong, whatever other favourable indications may be present, I have never known a profitable mine. The best direction for different metals varies very greatly. In these remarks I take the present magnetic line, which is about 24° west of north. Tin lodes varying from 30° north of east to 30° south of east (magnetic), a range of 60° have been found profitable for working. Copper lodes, with a similar range of 60°, but varying from 10° north to 50° south of east, have been found profitably productive. Lodes varying from 5° north to 25° south of east have, however, yielded the greatest quantity of copper ore. In lodes whose direction is from 25° to 50° south of east very rich ores are found, but not in very great quantities. In lodes bearing more than 10° north of east (or 34° north of true east) the ores are generally very poor. The best direction for lead lodes is from 10° west of north to about 40° east of north. I believe the above to be a statement of facts, as found existing in the mines of Cornwall and Devon. The exceptions are exceedingly rare, and

\* Remarks on the Geology of Cornwall and Devon. By Chas. Thomas, of Dolcoath. Redruth: Tregaskis.

when they occur the cause can be ascertained. The *St. Just* district, I think, affords the only apparent exception to the rule, and some of the deposits of copper ore even there may be satisfactorily accounted for, in accordance with this rule. I have found, in numerous instances, a rich course of copper ore while the direction of the lode was south of east, due east, or 5° north of east, but a turn in the lode taking place of 5° to 7° further north, the lode would not pay for working.

The three particulars above described are, in my judgment, of paramount importance in estimating the value of any locality as a mining speculation. Other indications, of minor importance, I shall not now describe. But if, on careful consideration, the geological character, size, appearance, and composition of the lode, as well as its direction, are found to be in accordance with the preceding description of the general features of a good mining district, a favourable result may be confidently anticipated. This remark applies only where the three specified circumstances decidedly concur. Intermediate and partial appearances may, for a time, mislead the most cautious and experienced observer. While one or even two of them may be very prominent, and yet the third being wanting, the whole may prove a failure.

## COLLIERY MACHINERY.

This was the subject of a lecture at the School of Mines, Bristol, delivered on April 4, by Mr. MARK FRAY, the respected master of the school. The lecturer, after some preliminary remarks upon the injudicious policy of expending money on inefficient and defective machinery, under the impression that economy in colliery works would follow from scarcity of materials, proceeded to observe:—"Wherever machinery can be employed to do any portion of the work of the colliery, it will, in most cases, be profitable to avail yourselves of it. This is an age of machinery, and the progress and success of almost every description of work, in a great measure, depends upon the skillful use of machinery therein. Machinery advantageously employed at the surface of some of the best conducted and most profitable collieries, is at others entirely neglected; while the waste of time, of material, and of labour is to be met with at some collieries in tipping the coal tubs on the loose heap, and again separating and filling the coal into carts and trucks by unaided manual labour. Proper tipping machines, screens, spouts, and self-acting apparatus for re-raising the small coal to a level from which it can be run down spouts into the carts or wagons, may in all cases at any rate partially obviate such waste. Self-recording weighing machines would be an invaluable addition to the surface machinery; by such the weighing of the tubs, as they are taken from the cages, and of the carts or trucks as they leave the coal yard, would be greatly facilitated, and much time would be saved. Wherever much manual labour can be economised by the substitution of machinery, as a general rule, it will be a means of saving to do so. Self-acting inclines and steam-engines for the underground transport of coal, and small ponies where such machinery cannot be brought to bear, are the means of true economy in underground machinery. No doubt, in course of time, we shall have practicable and economic coal-cutting machines, and the present laborious work of coal cutting by manual labour will be looked upon as one of the charities of the past. We speak now of their mode of carrying coal underground in the early days of coal mining in Scotland and a rude and somewhat uncivilised practice, only to be met with in the pages of mining history, and happily done away with in these times; but I can never witness the work of carting as it is called in this part of the country without being haunted by the impression that it is equally as rude a practice as Scottish miners were guilty of at the time to which I have just referred. In practice *coals* were carried on creels on their backs; at the present time boys and men haul the coals in small carts along the low passages of the mine, by a rope passing round their waist and through between their legs being attached to the cart. This practice would look much better on the pages of history than in actual operation in so many of the collieries of our own day, where this seems of coal are being worked. I do not mean to give these remarks as in any degree reflecting negligence or want of skill on the part of managers of those collieries where carting is now practised, but simply to call your attention to the great necessity there is for improvement in this department of underground machinery. The methods which have in most cases been adopted for raising water from the deep workings of the mines to the bottom of the shafts, are evidently admissible of very considerable improvements, and is, therefore, a subject well worthy our attention. I may well remark about machinery and engineering in general, that there is no standard of excellence; the matter is a relative one, and we may fairly argue that the machinery of today will be but little for the mining engineer of some half a century hence. I must, however, guard you against an error which these remarks are likely to induce; an error which is a great cause of failure to make collieries pay, by engineers who are apparently enthusiasts in improvements. Some men are for ever pulling down and building up; their idea of economy seems to be inseparable from always doing something which no one else has ever yet done, and their whole lifetime is spent in attempting to carry out their ideal improvements, and the profits of the collieries of their various employers are largely absorbed by incessant alterations in the machinery and working of the mine. No instruction or advice that myself or anyone else can give you with respect to guarding against these two extremes—neglecting all legitimate improvements on the one hand, and for ever making expensive alterations on the other, will ever make up for deficiency in common sense, or inability to deliberately investigate the expense and the practicability of proposed alterations in machinery before making them. You must ever hold in your hand the balance of profit and expense, and you must be very careful that strong prejudice, a love of change, or a vain ambition to be first does not so dim your sight as to cause you to mistake the balance pan. If the profit does not considerably outweigh the expense, the safest way will be to make the best of your present outfit. I am, of course, supposing that the question in this case is simply one of pounds, shillings, and pence; where it is one of safety to the lives or limbs of the workmen you must then be actuated by motives vastly higher than simply those of pecuniary gain." The lecturer then described the improvements that have been made in the machinery of collieries at the surface and underground, and concluded with some practical remarks to his pupils upon the duty of their fully improving themselves on the matters to which he had adverted, by personal observation in their visits to various collieries.

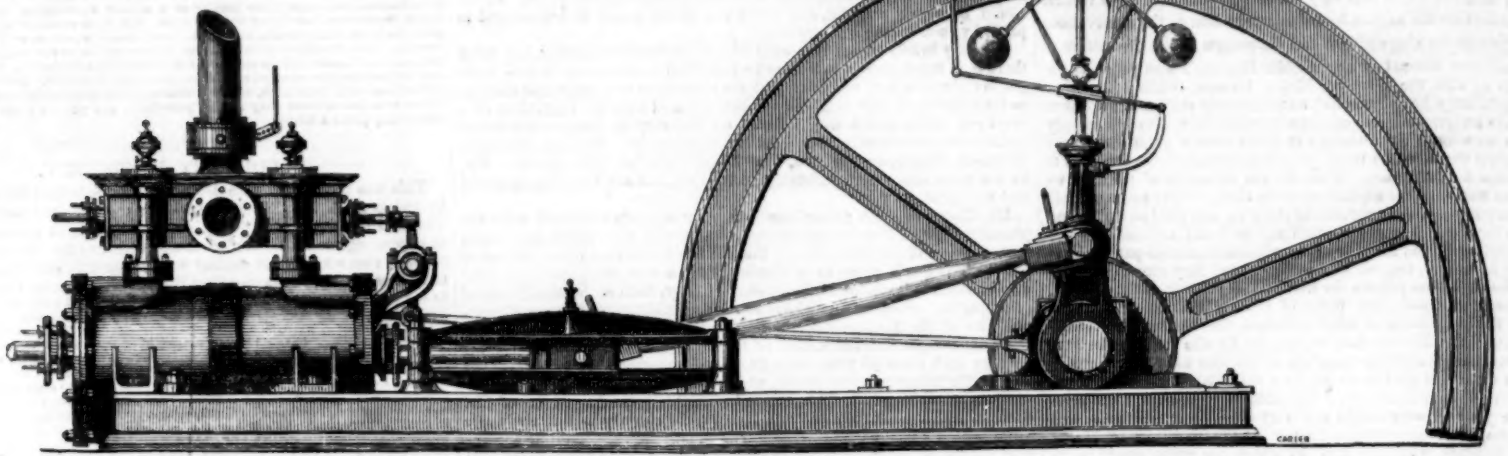
VENTILATION OF CORNISH MINES.—The insalubrity of the deep Cornish mines, owing to the almost total neglect of ventilation, and the primitive contrivances—simple ladders—provided for enabling the miners to ascend and descend, have been prominently brought before the Manchester Statistical Society in a paper by Mr. JOHN ROBERTSON. In the coal mines, well ventilated as they now are, a visitor feels the air alive and circulating briskly, but in the Cornish mines it is far otherwise. Though currents in the shafts and more open galleries are considerable, in the great majority of levels there is no, or only a very slight, current perceptible; and in all such levels as communicate only by one extremity with a shaft, or with other levels by a winze at some distance from their inner extremities (both of which kinds constitute the greater number of the working galleries) there is no current whatever, and, in fact, no possibility of there being one. Many of these galleries are several hundred feet in length, with no other outlet but their extremity at the shaft; a sufficient proof of the stillness of the air in Cornish mines is the fact of lanterns being unknown in them. The late Mr. Mackworth did not scruple to assert that the condition of the miner could only be realised if a room containing a number of persons were hermetically sealed until the temperature was raised many degrees and the lights burned dimly. Again, Mr. Moyle, of Penzance, writes that in the galleries and shafts the air is so dead that a candle held perpendicularly goes out in a short time, and the only way in which the miner can obtain light enough to work is by putting two candles together, and placing them horizontally. If such be the state of a Cornish mine it can readily be understood why banishment to the mines among the Romans was one of their punishments for criminals. Yet, as Mr. Mackworth remarked, a Cornish mine, in consequence of its numerous shafts, and the proximity of the workings to them, is much more readily ventilated than a coal mine, and he considers that the steam-engine and pumping machinery have received so many improvements at the hands of Cornishmen that ventilating machinery would not be neglected if placed under their charge. With respect to the ascent and descent of miners, Mr. Robertson first describes the Dolcoath man-engine, which has been the means of enabling miners who had retired from the state of slavery to resume underground work to return to their native land. He decided preference to a cage as used in coal mines, and in this Mr. W. J. Henwood, of Penzance, appears to agree with him; and it is certainly a great question whether ultimately adventurers do not benefit by the change, whether the man-engine or the safety-cage be the modification chosen. In conclusion, Mr. Robertson remarks that horses, sheep, and hounds are well cared for in matters of this kind man's self-interest is quickened, prompt, and skilful; far otherwise is it, however, if self be not obviously concerned—the chief charge to mining captains being "keep down expenses;" little attention being paid to the health or condition of the working miner. It appears that the only remedy for this state of things is to subject the Cornish and similar metallic mines both in Great Britain and Ireland to well-devised laws, and appoint inspectors to see to their enforcement. All this we have already in the case of coal mines, and why should those under consideration be an exception? Metallic mines have become more injurious to those labouring in them just in the degree that mechanical science has enabled the adventurer to penetrate deeper and deeper in pursuit of the lode. Mr. Boyle, in his essay on the "Causes of the Wholesomeness and Unwholesomeness of the Air," written nearly two centuries since, remarks that "such as constantly dig in the tin mines arrive at a great and vigorous age." What would this philosopher say were he to inspect the modern Cornish mine, and learn the degenerate physical condition of the miners?

PREVENTION OF ACCIDENTS.—An ingenious invention has just been patented (through Mr. James Wright, C.E., of New Bridge-street), for preventing accidents in cleaning windows, which consists in the employment of a false slide to the sash, and to this, under ordinary circumstances, the glazed portion is securely fastened. When, however, it is desired to clean the window, or, for any other purpose, turn the sash, by the aid of a key, the bolts which have kept the glazed portion in position are withdrawn, and the sash swings precisely in the same manner as an ordinary swing looking-glass. By the use of an improved slip, the air is entirely excluded whilst the sash is in position, and the most practised eye would be unable to detect that any but the ordinary sash was in use. The contrivance can be applied for a few shillings to any existing sash, and the immense saving of labour would speedily repay the outlay. But, apart from the value of the invention in consideration of its safety, its utility as a ventilator is not less worthy of remark, the sash being capable of being placed at any angle at pleasure, admits of its being made to keep an apartment at almost any temperature, without the slightest draught being perceptible. The invention altogether is as ingenious as it is simple, and will, doubtless, be generally adopted, as soon as its merits become known.

PRINTING BY WATER POWER.—In the application of water power as a motor for printing machines, we believe the Irish have the honour of being first in the field, the *Cork Herald* being now printed by water. This desideratum has been attained through the efficiency of an improved turbine, patented by Messrs. Schiele and Co., of Oldham, and by which the greatest regularity of motion is secured. The Cork Water Committee have now nearly completed their works, and the impetus produced by the high elevation, and consequent pressure, has been availed of to propel the turbine. The advantages of the turbine over other descriptions of wheels have been frequently pointed out in the *Mining Journal*, and it is astonishing they have not been more frequently employed. It is compact and economical, and working at the moment of its invention, high speeds are easily obtained; no lubrication is required; there are no stuffing-boxes, no vibration or noise in working; the foundation needed is only so much as is required on account of gearing, and in many cases the turbine may be supported by the piping alone; their suction pipes may be as long as in pumps; immersion in the tall water does not impair their efficiency; any fall of water is available; their regularity is superior to that of any others, through their being under the complete control of the patent governor. In the application of water power to printing, Messrs. Schiele have achieved a success, and the discovery of a perfect governor will, doubtless, admit of the employment of the turbine with equal facility for almost every purpose to which steam has hitherto been applied—provided, of course, that adequate water power be obtainable at a cheap rate. The same description of regulator has likewise been applied to smithy, cupola, and open fans with good results. We shall on a future occasion give the complete details of the invention.



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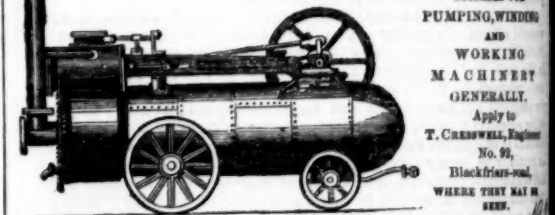


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